PT 7331   Motor Control and Clinical Applications

Fall 2017
3 credits (3-1-0)

COURSE DESCRIPTION: This course introduces students to theories and fundamentals of motor control, motor learning, motor development, balance control, and current methods in human movement analyses. Appropriate test selection, interpretation, and their implications on evidence-based practice in physical therapy will be discussed.

COURSE COORDINATOR: You-jou Hung, PT, MS, PhD, CSCS
Associate Professor
Office: Vincent 224
325-942-2742
yhung@angelo.edu

OFFICE HOURS: By appointment

COURSE INSTRUCTOR(S): Charlotte Buhle, PT, DPT
West Texas Rehabilitation Center
cbuhle@wtrc.com

OFFICE HOURS: By appointment

COURSE LOCATION: Science Building III, Room 213

MEETING HOURS: Monday 8:00am – 10:00 am: Lecture & Lab.
Wednesday 8:00am – 10:00 am: Lecture & Lab.

CLOCK HOURS: 45 lecture hours
15 laboratory hours

COURSE PREREQUISITES: Successful completion of previous DPT coursework

COURSE OBJECTIVES: At the end of this course, the students will have demonstrated mastery of the subject by being able to:

1. Describe the anatomy and physiology of motor control and their relationship to various disturbances/abnormalities in motor functions (CAPTE Standard: 7A)
2. Compare and critique traditional and contemporary theories of motor control and motor learning (CAPTE Standard: 7D9)
3. Apply theories of motor control and motor learning to the development of physical therapy interventions (CAPTE Standard: 7D10)
4. Compare traditional and contemporary techniques for the measurement of motor performance (CAPTE Standard: 7D19)
5. Analyze clinical implications of motor control and motor learning research (CAPTE Standard: 7D9)
6. Compare normal and abnormal postural control and describe different strategies of postural control (CAPTE Standard: 7D19)

7. Discuss principles of motor control and motor learning to optimize acquisition, retention, and transfer of motor skills in a rehabilitation setting (CAPTE Standard: 7D10)

8. Discuss and evaluate different stages of motor development (CAPTE Standard: 7D19, 7D20)

9. Demonstrate service learning and community engagement by performing motor development screening tests for children at various ages at a local early childhood center (CAPTE Standard: 7D10, 7D19, 7D20)

TEACHING METHODS/PHILOSOPHY:

Lecture sessions will consist of traditional lectures supplemented by PowerPoint presentations, handouts, discussion of case studies and current literature, individual/group presentations, and reading assignments. Audiovisuals and computer-assisted instruction as appropriate will be included in learning activities. Blackboard will be used to post important announcements, grades, and reference materials.

Laboratory sessions will focus on the functional and clinical applications of the topics presented during lecture sessions. They will be imbedded within corresponding lectures. Depending on the topic, proper laboratory attire will be announced a week prior to the session.

TENTATIVE SCHEDULE: See attached.

REQUIRED TEXTS:

The following textbooks are “recommended” for this course.


GRADING/EVALUATIVE PROCEDURES:

| Exam I      | 20% |
| Exam II     | 20% |
| Exam III    | 20% |
| Quiz (3)    | 20% |
| Lab. Report (3) | 20% |
| Total       | 100% |

The final course grade will be assigned based on the cumulative percentage of points earned throughout the course:

A = 90-100
B = 80-89
C = 70-79
F = 69 or less

Students must score 80% or better in total (A or B grade) in order to meet mastery for this class. Exceptions may be sought by petition of the Academic Committee of the Physical Therapy Program and/or Course Coordinator who may require remediation and may be given the opportunity to repeat
certain activities.

Examinations and quizzes may consist of multiple choice, true-false, matching, and short answers. Students are expected to take all written examinations on the day they are scheduled. Students may arrange to take the exam prior to the scheduled date with proper approved excuse. There will be no make-up examinations for unexcused absences.

HONOR CODE STATEMENT

Our students believe that ASU students should maintain complete honesty and integrity in their academic pursuits.

The Honor Code at ASU describes expected academic behavior of both faculty and students, and it consists of an agreement between the student and the academic community to foster academic integrity, to value student educational goals, and to maintain the positive academic reputation of ASU. Angelo State University expects all students and faculty to engage in all academic pursuits in a manner that is above reproach and to maintain complete honesty and integrity in the academic experiences both in and out of the classroom.

ASU students and faculty will not participate or condone
- Plagiarism
- Cheating
- Fabrication of data
- Misrepresentation of information
- Misuse of library materials
- Misuse of technology
- Conspiring with others to commit these acts

ASU students are responsible for understanding the Honor Code as well as the individual academic requirements and stipulations for each course. This includes carefully reading the Angelo State University Student Handbook and reading the syllabus of each course. Students should ask for clarification of any ambiguous aspect of the syllabus.

To facilitate this code of ethical conduct, ASU has an Academic Integrity Committee, a committee composed of both students and faculty, which has the responsibility of reviewing cases of suspected academic dishonesty, which may be brought to it. The committee’s membership of students and faculty reinforces ASU’s commitment to academic integrity in and out of the classroom.

STUDENTS WITH DISABILITIES

University Statement on Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments Act of 2008 (ADAAA), and subsequent legislation.

Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student’s responsibility to initiate such a request by emailing ADA@angelo.edu or by contacting:

Mrs. Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
University Center, Suite 112
325-942-2047 Office
When a student states he or she could meet the program's technical standards with accommodation(s), the Office of Student Affairs will confirm that the stated condition qualifies as a disability under applicable laws. If the condition qualifies as a disability, the University will determine if it agrees that the student can meet the technical standards with reasonable accommodation; this includes a review of whether or not the accommodation requested is reasonable, taking into account whether or not the accommodation would jeopardize clinician/patient safety or the educational process of the student or the institution, including all course work, clinical educational experiences and internships deemed essential to graduation. Students are required to read and sign the DPT program’s technical standards (DPT Program Student Handbook Appendix I) form and to update their responses on this form if their health status changes.

A student who requires accommodation to meet the technical standards must obtain verification by the Office of Student Affairs that proper reasonable accommodation is available for the student to meet the standard. The program will not provide accommodation without such written verification.

RELIGIOUS HOLY DAYS
Faculty will provide accommodations for student absences for observance of a religious holy day(s) (OP 10.19). Students should make every effort to inform a faculty member at the beginning of the semester regarding these absences.

ATTENDANCE/TARDINESS POLICY
Attendance and promptness to classes, meetings, and future work obligations are considered professional behaviors. As this department is preparing potential professionals in the area of physical therapy, it is part of our expectation that student presence and timeliness will be held in highest regard. Tardiness is a disruption to the instructor and fellow students. A student is considered tardy if he/she arrives for class after the instructor has begun class activities. Please see the following related to implications from excessive lateness or absences without a reasonable excuse:

a. First offense - verbal warning
b. Second offense - second verbal warning, initiation of Disciplinary Tracking Form.
c. Third offense - 1% off final course grade
d. 1% off final course grade for each additional unexcused tardy or absence

Per the student handbook, 2 or more occurrences combined or mixed will result in the initiation of a Disciplinary Tracking Form.

If a student has an unexcused absence during integrations it may lead to the removal of that student from that clinical environment. It is the responsibility of the student to contact the clinical site and give notice if they are ill, or have transportation issues.

If the student is unable to attend class, it is the student’s responsibility to either call the PT office at 942-2545 or the office of the professor of the class directly. This notification should be made prior to commencement of said class.

Continued issues with tardiness/attendance across all courses will result in disciplinary probation and will be referred to the PT faculty for consideration of options, including program dismissal.

The PT faculty is not oblivious to doctor’s appointments and other potential hazards and emergencies in daily life. Simply taking responsibility to notify the office or the professor if issues arise is considered professional behavior. Please do not rely on a classmate or other form of notification, as these have proven unreliable in years past.
ATTENDANCE AT ALL SCHEDULED EXAMINATIONS IS MANDATORY. Any unexcused absence from an examination will automatically result in a score of ZERO for that examination. Any student absent from examinations due to illness or injury must have a written justification from their physician. Absence from an examination for any other reason must be excused before the time of the scheduled examination or brought about by a very serious circumstance. For excused absences only, make-up examinations must be taken no later than one week after the student returns to class. Extended absences must be approved by the Program Director of Physical Therapy.

TENTATIVE SCHEDULE


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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td><strong>Week 1</strong></td>
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<tr>
<td>Aug. 28</td>
<td><strong>Theoretical framework of motor control</strong></td>
<td>Shumway Ch.1</td>
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<td>Introduction of motor control</td>
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<td>Aug. 30</td>
<td>The nature of movements</td>
<td>Kandel Ch.33,35</td>
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<td>Categories of movements</td>
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<td>Reflex</td>
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<td>Reflex lab</td>
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<td><strong>Week 2</strong></td>
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<td>Sept. 4</td>
<td>Labor Day</td>
<td>Shumway Ch.16</td>
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<td>Sept. 6</td>
<td>Voluntary movement</td>
<td>Kandel Ch.33</td>
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<td>Reaction time</td>
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<td><strong>Week 3</strong></td>
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<td>Sept. 11</td>
<td>Feedback and feed-forward control</td>
<td>Shumway Ch.1,16</td>
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<td>Theories of motor control-part I</td>
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<td>Sept. 13</td>
<td>Theories of motor control-part II</td>
<td>Shumway Ch.1,16</td>
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<td>Motor control theory lab</td>
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<td><strong>Week 4</strong></td>
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<tr>
<td>Sept. 18</td>
<td>Quiz 1</td>
<td>Shumway Ch.2,4</td>
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<td>Sept. 20</td>
<td><strong>Theoretical framework of motor learning</strong></td>
<td>Kandel Ch.65</td>
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<td>Introduction of motor learning</td>
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<td>Memory and motor learning</td>
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<td>Working memory lab</td>
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<td><strong>Week 5</strong></td>
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<td>Sept. 25</td>
<td>Theories of motor learning</td>
<td>Shumway Ch.2</td>
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<td>Sept. 27</td>
<td>Stages of motor learning</td>
<td>Shumway Ch.2</td>
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<td>Feedback and balance control</td>
<td>Kandel Ch.37, 38</td>
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<td><strong>Week 6</strong></td>
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<td>Oct. 2</td>
<td>Exam I</td>
<td>Handout: JOSPT</td>
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<td>Oct. 4</td>
<td>Feed-forward and feedback control lab (group 1, 2, 3)</td>
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<td><strong>Week 7</strong></td>
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<td>Oct. 9</td>
<td>Feed-forward and feedback control lab (group 4, 5, 6)</td>
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<td>Oct. 11</td>
<td>Feed-forward and feedback control lab discussion</td>
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<td>Practice and motor learning</td>
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<td><strong>Week 8</strong></td>
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<td>Oct. 16</td>
<td>Recovery of function</td>
<td>Handout: JOSPT</td>
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<td>Clinical implication: motor control and motor learning of</td>
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### Week 9

**Oct. 18**  
**Physiology of motor control**  
H-reflex, M-wave, and F-wave, and their clinical applications  
CNS function in motor control and motor learning  
Feed-forward and feedback control lab report due  

- Shumway Ch.2, 3  
- Kandel Ch.34,35

### Week 10

**Oct. 23**  
Quiz 2

**Oct. 25**  
Motor systems and motor unit  
Voluntary control of muscle force  
Immobilization and training adaptation of skeletal muscles

- Shumway Ch.3  
- Kandel Ch.22,35

### Week 11

**Nov. 1**  
Exam II

**Nov. 6**  
Mechanoreceptors  
Other sources for proprioception  
Ascending sensory pathways

- Kandel Ch.22,35

**Nov. 8**  
*Constraints on Motor Control: an overview of neurologic impairments*  
Motor weakness  
Abnormal muscle tone  
Coordination abnormalities  
Position sense lab report due

- Shumway Ch.5

### Week 12

**Nov. 13**  
*Infant Reflexes and Motor Development*  
Infant reflexes, development milestones, and motor development assessment

**Nov. 15**  
Motor development (Buhle and Hung)  

- Shumway Ch.8

### Week 13

**Nov. 20**  
9-11 AM  
Early Childhood Center (ECC)  
Motor development lab (group 1) (Buhle and Hung)

**Nov. 22**  
Thanksgiving Holiday

### Week 14

**Nov. 27**  
9-11 AM  
Early Childhood Center (ECC)  
Motor development lab (group 2) (Buhle and Hung)  
Motor development lab report due for group 1

**Nov. 29**  
Quiz 3

### Week 15

**Dec. 4**  
Postural control and posture evaluation  
Motor development lab report due for group 2

**Dec. 6**  
Postural control development  
The impact of aging on postural control

- Shumway Ch.8  
- Shumway Ch.9

### Week 16

**Dec. 11**  
Exam III (final exam): 8:00 am – 9:30 am

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**Laboratory components:**

- Lab 1: Reflex  
- Lab 2: Motor control theories
Lab 3: Working memory
Lab 4: Feed-forward and feedback control (lab report required)
Lab 5: Position sense (lab report required)
Lab 6: Motor development lab (lab report required)